

Missouri Department of Natural Resources
OPERATOR CERTIFICATION SECTION

Water & Wastewater Digest

Spring 2015

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Horsehair Worms

Learning About Macroinvertebrates

Sometimes we get so caught up in focusing on what we have to do to protect streams that we can lose focus on why we should be protecting them. Besides all the uses humans have for water, we should also consider the needs of the aquatic species that actually live in the water. There are a wide array of animals that live in streams, each with its own unique niche and a specific tolerance for pollution. As we study the life cycle of macro invertebrates, we can learn to estimate water quality just by observing which ones can live in the stream. For instance, consider the horsehair worm.

Horsehair worms are remarkable threadlike roundworms that resemble the hair of a horse's tail or mane. These long, vigorous worms may be observed in streams, mud puddles and ponds; but are also commonly noticed in domestic water containers such as bird baths, swimming pools, water troughs, etc. They are considered to be very pollution tolerant, but their presence in a stream does not necessarily indicate a water quality problem. Horsehair worms, also known as Gordian worms, belong to the phylum *Nematomorpha*. They are similar to other aquatic worms, but are not segmented.

The body of the horsehair worm is extremely long; lengths of a foot or more are not uncommon. The diameter is usually not much more than a pencil lead (1/25 to 1/16 inch). Their color can vary from cream to tan to blackish-brown. When found, they are usually twisted and coiled, much like a piece of discarded thread.

Adult horsehair worms mate in the water and the female lays long strings of gelatinous eggs. Once the larvae emerge, they form a cyst around themselves and inhabit vegetation in the wetted edge of a stream or waterbody. Unsuspecting insects such as grasshoppers, crickets, cockroaches, beetles and katydids ingest the vegetation and become infested with the larva. Once inside its host, the cyst dissolves and the larva burrows through the wall of the gut to grow in the body cavity of the insect, absorbing nutrients through its skin as it has no digestive system.

Once the larva becomes a fully developed adult, it causes its host to become thirsty. Once a host is in close proximity to water, the horsehair worm bursts through the abdominal cavity, killing the host and becomes a free-living adult. Adults live up to six months and do not feed.



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www.dnr.mo.gov

The hair-like nature of these worms is so noticeable that it was formerly thought that they evolved spontaneously from the hairs of a horse's tail. Historically, horses were watered from large troughs and quite often hairs from their mane or tail could fall into the water. Grasshoppers or crickets could also fall into the water where the worms would emerge from the insect to be seen among the real horse hairs. Thus the superstition developed that a horse's hair left in the water would eventually become a worm. Horsehair worms are completely harmless to humans. They do not infest people, livestock, pets or plants.



Consumer Confidence Reports and Compliance Help Tools

Please share this information with the person who is responsible for Consumer Confidence Report (CCR) distribution and certification. While many systems found the electronic delivery method of the CCR to greatly reduce distribution costs in both printing and postage, there was a significant amount of noncompliance with the 2013 CCRs. The most common issues included missing the July 1 or Oct. 1 deadlines, missing supporting documentation with the certification form, and typos when using the eCCR direct delivery method. A water system does not need a web address of its own in order to make the CCR available electronically. The department has posted all CCRs free of charge on the department's website at www.dnr.mo.gov/ccr/MO0000001.pdf. This web address, also known as a Uniform Resource Locator (URL) will be unique to each water system where MO0000001 is the public water system's identification number. The department is encouraging all water systems to take advantage of the tools and information provided on the CCR home page (www.dnr.mo.gov/ccr/ccr.htm) to assist them with CCR compliance this year.

The Missouri Department of Natural Resources, with assistance from Missouri Rural Water circuit riders, developed a seven-minute video to help community water systems prepare and deliver their consumer confidence reports using electronic delivery. The video is titled "Finding Your Electronic Consumer Confidence Report (eCCR) and The Direct Delivery Method of eCCR Distribution." The video is available on the MissouriDNR channel of YouTube or can be accessed directly at www.youtube.com/watch?v=eMvi4O5HoFs. The video explains the CCR, where to find the online "skeleton" CCR generated for each water system by the department and what must be done in order to make the CCR available to customers.

In the past, community water systems were required to mail or hand-deliver the annual CCR to each of its water customers to qualify for direct delivery. This will be the third year community water systems have the option to directly deliver the CCR to customers electronically via the Internet. A water system can provide the URL to their customers via their utility bill, newsletter, or other means. To qualify for direct delivery, the URL must go directly to the full and complete CCR for that year. The water system must also inform all customers in the same notification that its CCR is available upon request in a paper copy format.

As mentioned previously, the department will provide a "skeleton" CCR generated for each system. If a water system was supplied water by an out of state provider or additional testing was performed by an outside laboratory and not reported to the department, those results must also be added to the "skeleton" CCR before being distributed to customers. The following table shows the actions required and deadlines for reporting.

Deadline	Action Required
April 1	Reseller Report to Consecutive Systems ("Skeleton" CCR posted on DNR Website)
July 1	CCR Distributed to Customers
Oct. 1	CCR Certification Form Returned to DNR

Systems that fail to meet reporting deadlines will receive violations according to CSR 60-8.030. If you have questions about this process, need or want changes made to your CCR, or prefer to use your own URL, please email the department at CCR@dnr.mo.gov.

Recirculating Sand Filters and the Squirt Height

The majority of recirculating sand filter systems in Missouri are composed of gravel, not sand. However, there are some systems designed with foam, peat moss or textile. What should we call them? As a general term for these types of wastewater treatment systems, this article will refer to them as “packed media beds.”

Packed media bed systems have several stages of treatment such as a septic tank, recirculating tank, pump chamber, flow splitter, packed media bed, etc. The purpose of this article is to address one very important (and often overlooked) aspect of a packed media bed; the “squirt height.”

Lateral lines in packed media beds are laid the length of the media bed, two feet apart. Holes (1/8 inch normally) are drilled in the top of the laterals, also spaced two feet apart. The holes (orifices) have some type of splash pad above them to keep the water from shooting up into the air. The laterals and splash pads are then covered with a thin layer of gravel to protect them from the sun’s harmful rays, which can cause PVC piping to become brittle.

Most of these systems are designed to have squirt height of five to eight feet from each orifice. As orifices become plugged, the squirt height from the remaining orifices will increase. For every plugged orifice, a system will lose that area of the packed media bed for treatment. It is not uncommon for 50 percent of a system’s orifices to become plugged in one year.

At a minimum of twice a year, check the squirt height of your laterals and record it. Remove the gravel and splash pad from the last orifice at the end of each lateral; the orifice farthest from the pump. Turn the pumps on and off until you have checked all the laterals and all the pumps. An increase of squirt height indicates orifices are getting plugged.

A decrease of squirt height also indicates a problem or problems. A lower squirt height may be a problem with pumps getting weak, worn impellers, intake or discharge problem. The lower squirt height could also be from buildup inside the lateral lines restricting the flow, plugged lines or plugged valves.

Squirt height should be checked at the startup of a system and recorded for future reference and comparison. If squirt height at your system hasn’t already been measured and recorded, you should

check it as soon as possible. If you want assistance with operating or understanding a facility, have questions about your permit, need help with reports, paper work, etc., request a technical assistance visit by contacting your local regional office. To find the office nearest you, visit www.dnr.mo.gov/regions/regions.htm.

Drinking Water Sampling Information for 2015

The 2015 bacteriological sampling calendars were mailed in December to all systems operating on a year-round basis. If you have not received the 2015 sampling schedule and would like a copy, please visit www.dnr.mo.gov/env/wpp/pdwb/sampling-schedule.pdf or contact Ellen Harrell at 573-751-1077 or by email at ellen.harrell@dnr.mo.gov

For public water systems that submit samples to the Department of Health and Senior Services - State Public Health Laboratory, we recommend periodically checking for changes to courier pick up locations and times. To check for changes, please visit www.dnr.mo.gov/env/wpp/pdwb/courier-list.pdf

To check on the status of a public drinking water sample, visit the Missouri Drinking Water Watch website at www.dnr.mo.gov/DWW/indexSearchDNR.jsp. Type in your water system name and hit Enter. Click on the PWSD ID# link for your water system and then click the “TCR Sample Result” link at the top of the page to view bacteriological sampling history. If you have any bacteriological monitoring questions, please contact Scott Weckenborg with the department’s Public Drinking Water Branch at 573-526-1124 or by email at scott.weckenborg@dnr.mo.gov.

Additional sample bottles can be ordered anytime online by visiting www.dnr.mo.gov/env/wpp/labs/water-analysis.htm.



Adjusting Fluoride Feed Rates to Meet CDC's Optimal Level

Approximately 100 public water systems in Missouri that fluoridate received additional information with their December fluoride sample results. The new annual fluoride report compared the Centers for Disease Control and Prevention recommended optimal fluoridation level against monthly fluoride results taken and reported by the water system and the monthly submitted sample results reported by the Department of Natural Resources – Environmental Services Program laboratory. The lab results and the water system results should be consistent as well as provide a monthly check that testing equipment is properly calibrated. Additionally, a water system is required to monitor daily the fluoride level at the entry point to the distribution system. This is the best way to monitor if adjustments are needed to the chemical feeder. The new annual report is intended for informational purposes to help systems recognize if recalibration of test equipment or feed rates are necessary to achieve the optimal level of fluoride. Water systems may want to contact a water specialist from their local department regional office for assistance with this process.

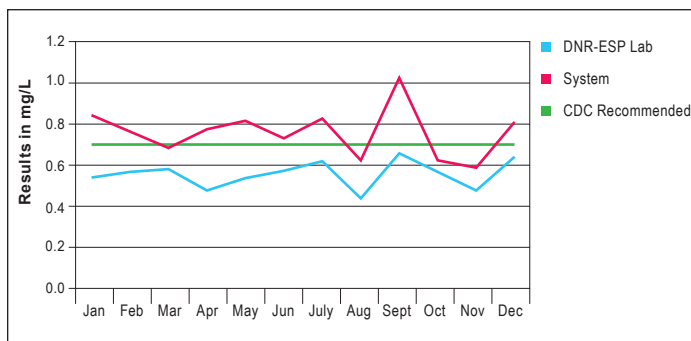
In 1962, based on scientific studies showing that fluoride reduces tooth decay, the U.S. Public Health Service recommended the amount of fluoride in drinking water range from 0.7 to 1.2 milligrams per liter (mg/L). Scientists set the range by taking into account different levels of children's fluid intake according to the average annual temperature in different regions of the United States—less fluoride was added in warmer, southern climates where it was believed that people drank more water, and more was added in cooler, northern climates where it was believed that people drank less. Over the past several decades, many factors, including the advent of air conditioning, have reduced geographical differences in water intake. In 2010, the U.S. Department of Health and Human Services began reviewing new information related to fluoride intake and later proposed changing the recommended level for community water systems to 0.7 mg/L.

In addition to fluoridating, fluoride can occur in drinking water naturally as a result of geological deposits. 10 CSR 60-4.030 establishes the maximum contaminate level for fluoride to be 4.0 mg/L and 10 CSR 60-4.070 sets the secondary standard (SS or SMCL) for fluoride at 2.0 mg/L. One might ask, "Why are the drinking water standards different from the CDC's recommended optimal fluoridation level?"

These items are different because these benchmarks have different purposes and are set under different authorities. The maximum contaminant level and secondary standard of 4.0 mg/L and 2.0mg/L are set to protect against risks from exposure to too much fluoride. Adults exposed to excessive consumption of fluoride (4.0 mg/L) over a lifetime may have increased likelihood of bone fractures, and may result in effects on bone leading to pain and tenderness. Children aged 8 years and younger exposed to excessive amounts of fluoride (2.0 mg/L) have an increased chance of developing dental fluorosis. Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. The CDC's proposed recommended optimal level of 0.7 mg/L, is set to promote public health benefits of fluoride for preventing tooth decay while minimizing the chance for unwanted health effects.

MO8010100 ANYTOWN
2014 Fluoride Results (in mg/L)

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
DNR-ESP Lab	0.54	0.57	0.58	0.49	0.54	0.58	0.62	0.44	0.65	0.58	0.49	0.64
System	0.84	0.75	.069	0.78	0.81	0.73	0.82	0.62	1.02	0.63	0.59	.080
CDC Recommended	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70



Please see online edition of the Spring 2015 Digest for a more detailed graph of 2014 Fluoride Results.

Sewer Infrastructure Grant Funding

The Department of Natural Resources' Financial Assistance Center now has additional funds to continue to support our Small Community Engineering Assistance Program (SCEAP) and Rural Sewer Grant (RSG) program. The SCEAP helps pay the costs of wastewater engineering reports or facility plans. The Rural Sewer Grant program helps fund upgrades to wastewater treatment facilities to meet new permit limits or to install a sewer system to a community that currently does not have a centralized sewer. The RSG can also help pay for sewer lines to connect an area that was previously unsewered.

Both of these programs are geared toward small communities of 10,000 or less to help them take the first steps in evaluating their sewer systems and supply much needed grant funds to make the necessary sewer infrastructure improvements more affordable to its citizens. The department now has available \$1.5 million in SCEAP funds and \$3.6 million in RSG funds.

The SCEAP is a relatively new program for the department and has been a huge success. The program is available for municipalities, counties, public sewer or water districts, political subdivisions or instrumentalities of the state with a population of less than 10,000. The program offers funding for wastewater engineering costs incurred in preparation of a facility plan.

Communities may be eligible to receive an 80 percent grant with a 20 percent recipient match, while disadvantaged communities may be eligible to receive a 90 percent grant with a 10 percent recipient match. A disadvantaged community is defined as any community with a population of 3,300 or less, whose user rates will be at or above two percent of the median household income and the median household income is at or below 75 percent of the state average. The grant amount shall not exceed \$50,000.

The Rural Sewer Grant program has not had funds to support it for many years. Public sewer districts, public water districts and communities of less than 10,000 population and not located; in whole or in part, in an area of St. Louis County or City encircled by Interstate Route 270, or in an area of Jackson, Clay or Platte counties encircled by State Routes 150 and 291 and Interstate Routes 29 and 635 are eligible to apply.

The grants cover up to 50 percent of the eligible costs of a project. The balance of the remaining eligible costs and all the ineligible costs must come from another funding source. The maximum grant amount is the lesser of 50 percent of the eligible project cost or \$1,400 times the number of service connections. When the grant is to fund a collection system, the maximum grant is based on the number of new service connections. Grants are capped at \$500,000.

We accept and process applications all year round; there is no application deadline. The applications may be found on our webpages at dnr.mo.gov/env/wpp/srf/wastewater-project-guidance.htm or dnr.mo.gov/financial.htm. For additional information please contact Traci Newberry by email at traci.newberry@dnr.mo.gov or by phone at 573-526-0940.



VSAT and WHEAT Classroom Training Available in Missouri April 28-29

The U. S. Environmental Protection Agency will hold classroom training on two key water sector risk assessment tools:

- Vulnerability Self-Assessment Tool (VSAT), version 6
- Water Health and Economic Analysis Tool (WHEAT), version 3

Water and wastewater utilities of all sizes can use these tools to perform an all-hazards risk assessment. EPA has updated these tools to be easier to use, provide more capability, meet water sector risk assessment standards and offer federal SAFETY Act liability protection.

This two-day course will deliver free, hands-on instruction in using these tools; along with techniques for the most challenging parts of water sector risk assessments, such as estimating threats, vulnerability and consequences.

This course is free and appropriate for drinking water and wastewater utility staff; 13 hours of drinking water treatment, distribution and wastewater credit (respectively) will be issued for those who attend and sign the roster. The course identification number is 1501110; to register visit www.thetestportal.com/vsatwheat. If you have any questions, email Dan Schmelling at schmelling.dan@epa.gov. **All attendees will be required to bring their own laptops.** Take advantage of this free opportunity to learn how your utility can use EPA tools to enhance your security and resilience!

Preparing for the Revised Total Coliform Rule, Part 1 of 4: Overview

The Total Coliform Rule has been in effect since 1990. This is one of the more important rules because the requirements for bacteriological sampling affect every public water system, regardless of size or population. After several years of review and public input, the U.S. Environmental Protection Agency published revisions to the existing Total Coliform Rule on Feb. 13, 2013. The Revised Total Coliform Rule (RTCR) will become effective April 1, 2016. For this article we will give a brief summary of a few key features of the revisions.

- The total coliform Maximum Contaminant Level (MCL) will be removed and replaced with a Treatment Technique requirement for total coliforms.
- Under this Treatment Technique requirement, total coliform serves as the indicator of a potential pathway of contamination into the distribution system rather than a contaminant. Under the RTCR, total coliform bacteria by itself, does not necessarily indicate a public health threat.
- The RTCR eliminates the public notification requirements included in the Total Coliform Rule that were based solely on the presence of total coliforms in the distribution.
- A public water system that exceeds the total coliform Treatment Technique trigger level or incurs an E. coli MCL violation must conduct an “assessment” of the water system to determine if there are any sanitary defects that may allow contamination or waterborne pathogens to enter the distribution system.
- Failure to complete an assessment or correct any sanitary defects identified during an assessment within a specified time frame will result in a Treatment Technique violation, requiring public notification.
- The RTCR uses E. coli as an indicator of fecal contamination, rather than fecal coliforms, because E. coli is a more specific indicator of bacteria that originates in the mammal gut.
- The RTCR establishes an E. coli MCL. This is an acute violation and still requires public notification within 24-hours.
- The failure to collect all required repeat samples following an E. coli positive routine sample will now also result in an E. coli MCL violation.

- The E. coli MCLs are as follows:

<i>E. coli</i> MCL occurs with the following combinations:	
Routine Sample	Action Required
E. coli +	E. coli +
E. coli +	Total coliform +
E. coli +	Not all repeats collected
Total coliform +	E. coli +
Total coliform +	TC+ but not tested for E. coli +

- The number of monthly routine samples for each public water system will remain the same as the requirements under the Total Coliform Rule, which is based on the population of the water system. Systems utilizing surface water or ground water under the influence of surface water and systems providing iron removal or lime softening and serve a population less than 4,100 must continue to collect at least five routine samples per month.
- Water systems submitting one sample per month will not be required to submit a fourth repeat sample following a total coliform-positive routine sample. This does not affect the Ground Water Rule. Triggered source water samples will still be required.
- Additional samples the month following a total coliform positive sample will no longer be required for all water systems conducting monthly routine monitoring.
- Seasonal water systems that shut down and drain all or part of their distribution system will be required to conduct an approved start-up procedure, have safe samples and certify completion to the department before opening to the public each season.

For a copy of the federal RTCR and the EPA guidance documents, go to the EPA RTCR website: water.epa.gov/lawsregs/rulesregs/sdwa/tcr/regulation_revisions.cfm.

The department’s website for the draft Missouri RTCR rule and the status of the rule development is: www.dnr.mo.gov/env/wpp/rules/wpp-rule-dev.htm.

Please check the department’s Public Drinking Water Branch webpage for upcoming training for the RTCR. If you have questions or need clarification about the RTCR, please contact Scott Weckenborg with the department’s Pubic Drinking Water Branch at 573-526-1124 or your regional office.

In the next issue, part two will review treatment techniques and assessments.

Depleting the Water

Video Link

The television show, "60 Minutes," has posted an interesting video titled "Depleting the Water." In it, Leslie Stahl faces her fears and taste tests wastewater turned drinking water. The video is just under fourteen minutes in length and is very informative as well as interesting. You can find the video at the following link: www.cbsnews.com/videos/depleting-the-water/.

Lake Monitors Needed

The Department of Natural Resources' Water Protection Program is seeking monitors who live near a lake for a new lake monitoring program. We would like to have a group of volunteers willing to monitor the smaller lakes at least 10 acres in size that are not already being monitored by the Lakes of Missouri Volunteer Program.

Monitoring would involve taking temperature and Secchi disk measurements. Requirements for participation include having a boat or other means to monitor the deepest part of the lake and be willing to monitor once or twice a month during the warm season. Staff will come to your site to train you and will provide the Secchi disk and other monitoring equipment. Please consider becoming a lake monitor as another way to help keep Missouri's waters healthy.

Lake monitoring is a great way to get outside and enjoy nature while taking a proactive step towards its preservation. If interested, contact Susan Higgins at 573-526-1002 or susan.higgins@dnr.mo.gov.

Missouri Continuing Planning Process

The department's Water Protection Program is seeking public comment on proposed revisions to its Continuing Planning Process. This document reflects the ongoing planning processes for water quality and wastewater treatment within the Water Protection Program. The Water Protection Program manages regulatory, permitting, engineering, monitoring and assessment and financial assistance programs and, through its enforcement program, takes compliance assistance actions and enforcement actions as necessary. The Continuing Planning Process is open for public comment at dnr.mo.gov/env/wpp/cpp/index.html through March 9. Questions regarding the 2014 revisions can be emailed to carol.garey@dnr.mo.gov.

Drinking Water Week
MAY 3–9, 2015
What do you know about H₂O?

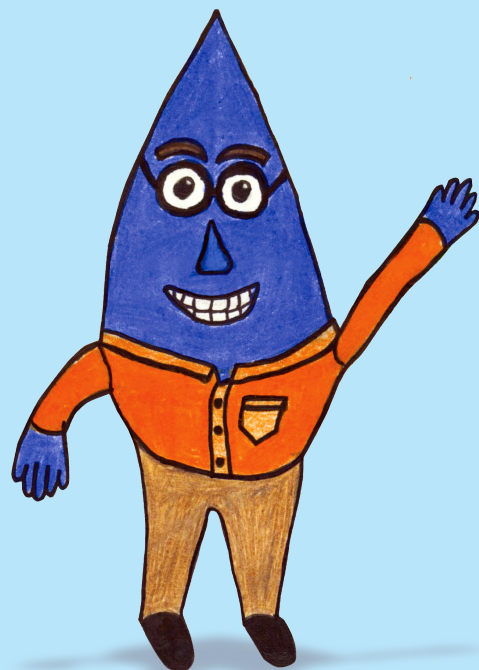
Missouri Student Wins National Drinking Water Week Artwork Contest

Here's a special shout-out to the student who won the American Water Works Association 2014 Drinking Water Week artwork contest - congratulations to Dawson Propst of Stover, Mo.

Dawson submitted his artwork in May of 2014 to be featured in the material for this year's campaign; his artwork is featured in AWWA ads, t-shirt art and certificates. This year's Drinking Water Week is May 3-9, and material is currently available for use to help educate others on this week-long event.

Congratulations again, Dawson!

Find out more at: www.drinktap.org/blog-details/articleid/3181/drinking-water-week-artwork-contest-winner-announced.aspx#sthash.Vpg4sTly.dpuf.



Recent Security and Vandalism Threats

There are approximately 160,000 public drinking water systems and more than 16,000 publicly owned wastewater treatment systems in the United States. Approximately 84 percent of U.S. population receives their potable water from these systems, and more than 75 percent of the U.S. populations rely on public wastewater systems for sewage treatment. So what can you do to protect our nation's critical infrastructure...?

Installation of cameras and alarm systems at public water system properties has proven to deter and prevent attacks of tampering and vandalism against water utilities. Tri County Water Authority, in Jackson County recently learned how vital its security cameras and alarm systems were when two vandals broke into a booster pumping station during the night of Nov. 19, 2014. The vandals used bolt cutters to cut through a chain link fence, then pried open a door and entered the building; however, they did not stay long as the forced entry triggered an alarm. When the alarm sounded at one of the facilities it also alerted water system officials via phone call within two minutes of the security breach. John Overstreet, general manager, was alerted to the invasion by phone at 12:14 a.m.; by 12:22 a.m. he responded to the alarm and made it onsite at the booster station along with law enforcement. Upon arrival, they found the pry bar used by the vandals to gain access to the building. No harm was done to the booster station or equipment. While the vandals were able to gain access, the security system in place likely deterred them from causing harm or vandalizing the infrastructure. Fencing, lighting, security cameras and steel doors play a critical role in protecting your infrastructure.



Operator Certification and Training

Exam Date	Location	Filing Deadline
Apr. 7	Lewis & Clark State Office Building 1101 Riverside Dr., Jefferson City	Mar. 8
	Department of Natural Resources 2155 N. Westwood Blvd., Poplar Bluff	
	Department of Natural Resources 2040 W. Woodland, Springfield	
May 5	Department of Natural Resources 500 NE Colbern Road, Lee's Summit	Apr. 5
	Lewis & Clark State Office Building 1101 Riverside Dr., Jefferson City	
	Department of Natural Resources 1709 Prospect Dr., Macon	
Jun. 2	Department of Conservation Powder Valley Nature Center, Kirkwood	May 3
	Lewis & Clark State Office Building 1101 Riverside Dr., Jefferson City	

Need Your Password to log in?

Certified operators are encouraged to access training reports by visiting the department's website at dnr.mo.gov/operator. To login, the password is the last four digits of your social security number.

In addition to checking training hours and renewing certificates online, this site provides a convenient place to view and update important contact information for public drinking water systems including the chief operator, sample collector and administrative contact.

For more information, contact the department's Operator Certification Section at 800-361-4827 or 573-751-1600.

Visit us on the Web

The list of approved training changes frequently as new courses are reviewed and approved by Department staff or trainers adjust schedules. By the time this newsletter reaches you, there may be new courses available in your area.

Visit us at dnr.mo.gov/env/wpp/opcert/optrain.htm for an up-to-date list of approved operator certification courses.



← Regular wastewater examinations are scheduled for 9 a.m., and the water supply examinations are scheduled for 1:00 p.m. unless otherwise noted on the admission letter.

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- ☐ New subscriber to the Digest? Complete section 2 below.
- ☐ Change of Address: Complete sections 1 and 2 or certified operators can update information online at www.dnr.mo.gov/operator.
- ☐ Cancelling subscription? Complete section 1 below.

Section 1 - Previous Address

Name _____

Operator Certificate # _____

Street _____

City/State/ZIP Code _____

Mail or Fax to:

Missouri Department of Natural Resources
Operator Certification Section
P.O. Box 176, Jefferson City, MO 65102-0176
Fax: 573-751-0678

Section 2 - New Address

Name _____

Operator Certificate _____

Street _____

City/State/ZIP Code _____

Daytime phone with area code _____

Training

The mailed version of this publication included a two page list of approved training courses and exam schedule that was available at the time of printing.

For a current listing of training, please visit:

dnr.mo.gov/env/wpp/opcert/oprtrain.htm